Methamphetamine Stability and Recovery on Painted Drywall Surfaces

By

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Introduction:

Studies conducted by National Jewish Health and others have documented that during the production and use of methamphetamine, the environment surrounding those operations becomes contaminated with methamphetamine. In many cases, painted drywall makes up a considerable portion of that environment and has frequently been found to be contaminated both in actual clandestine laboratories and in simulated cooks conducted by National Jewish Health. Contamination may be low in the case of methamphetamine use within a building (< 5 ug/100 cm^2) or it may be high as in the case of an actual clandestine laboratory (> 40 ug/100 cm^2). Methamphetamine levels due to the manufacturing process have been found to exceed 1000 ug/100 cm^2.

Work conducted by Minnesota Public Health indicated that, not only is methamphetamine released by the manufacturing process and plated onto surfaces, but in the case of painted drywall, it is absorbed by the paint and becomes part of the paint on the surface of the drywall. Researchers discovered that as more paint is removed from the painted drywall surface, methamphetamine continues to be detected. They did find that the methamphetamine did not appear to enter the gypsum material in the drywall itself. Additional work conducted by National Jewish Health also found that only 70% of the methamphetamine inoculated onto a painted drywall surface was recoverable using a solvent-wetted wipe. This suggests that the rest was absorbed into the paint of the drywall.

In addition to how much methamphetamine is absorbed into the paint, researchers have been curious as to how long methamphetamine will remain in the paint. Samples taken by National Jewish Health in actual clandestine methamphetamine laboratories have documented significant amounts of methamphetamine months after the laboratory had been shut down. There have also been reports of methamphetamine being present on surfaces years after a meth lab was discovered in a building. In some cases these methamphetamine levels have been linked to symptoms in individuals inhabiting those buildings.

This experiment was designed to answer two basic questions regarding painted drywall contamination with methamphetamine:

1. Once painted drywall has been contaminated with methamphetamine, what is the natural decline in the methamphetamine levels due to evaporation or other natural occurrences?

2. When painted drywall is sampled using a methamphetamine wipe, how much methamphetamine is removed and how much is left behind?

Methodology:

The drywall utilized in this project was contaminated with methamphetamine in the National Jewish exposure chamber on July 22. 2008. The drywall consisted of a 2” by 2”

square of 3/8th inch gypsum board that was painted with a latex enamel paint by painting the surface with two coats of paint, letting the paint dry and then painting it again with the same latex paint. Good coverage was provided and a gallon of paint was found to cover a total of 16 panels. After the painting, the paint was allowed to dry for a period of at least 2 days prior to contaminating the panels with methamphetamine.

Figure 1. Painting drywall with a base paint prior to contaminating the board in the chamber.

The drywall was contaminated in the chamber using 209 mg of methamphetamine. It was contaminated from 8:55 am until 9:08 am and the fans were run until 10:20 am. The drywall was removed from the chamber in the afternoon at approximately 4:00 pm. The methamphetamine utilized for contamination was a street-manufactured methamphetamine provided by the North Metro Task Force in Colorado. The drug was approximately 77% methamphetamine and also contained small amounts of amphetamine, ephedrine, and pseudophedrine. No MDMA or phenylpropanolamine were found to be present. The methamphetamine was put into a beaker and the chamber was sealed and the methamphetamine aerosolized in the chamber. The methamphetamine was completely aerosolized within a short time (mentioned above) and the beaker heater was turned off. The fans within the chamber were kept running for another period of time to assure even distribution of the methamphetamine.

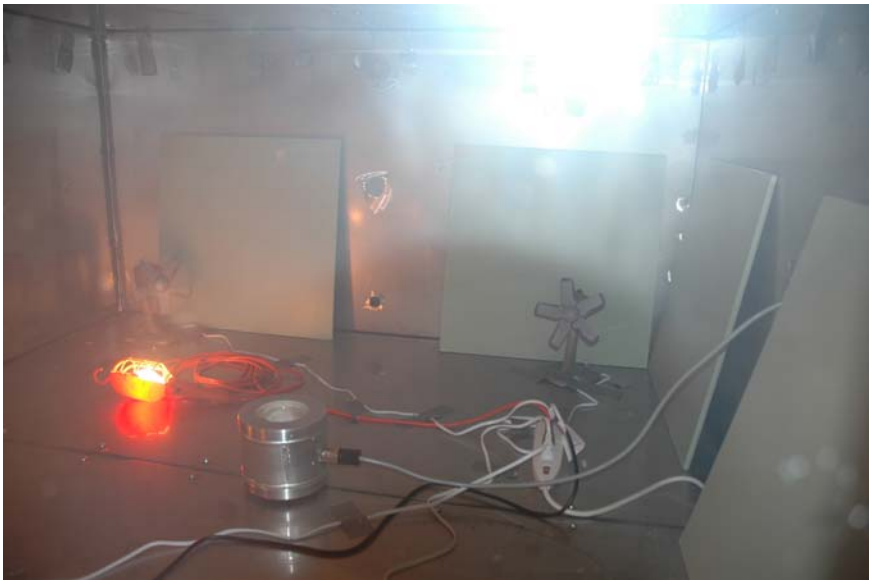

Figure 2. Painted drywall material being contaminated within the chamber.

After the material was removed from the chamber, it was placed in a plastic bag and transported to an area to be pre-sampled, washed, and post sampled.

Figure 3. Drywall being removed for transportation to an area to be sampled and treated.

After being transported, the panels were divided into 5 groups for testing. The groups were as follows:

a. One panel was not washed.
b. One panel was washed 1 time with Simple Green and then tested.
c. One panel was washed 2 times and then tested.
d. One panel was washed 3 times and then tested.

Seven samples were collected prior to treatment and after treatment, resulting in a total of 14 samples being taken from each of the drywall panels. Each sample consisted of a 100 cm^2 area being sampled from the panel using a 3"x 3" cotton swab to which 3 ml of methanol were added which was then put into a plastic centrifuge tube for analysis.

Figure 4. Panel prepared for initial pre-sampling after contamination.

After the collection of the pre-samples, the panels were then washed for the prescribed number of treatments using Simple Green. The Simple Green was used according to label directions for a maximum degreasing. The cleaner was applied full-strength from a spray bottle onto the surface of the panel. The cleaner was allowed to sit on the panel for approximately 1. 5 minutes and then it was washed off using clean water and a cloth. The surface was not scrubbed hard and no abrasive materials were utilized. After cleaning, the panels were allowed to dry completely before subsequent cleanings or prior to post sampling.

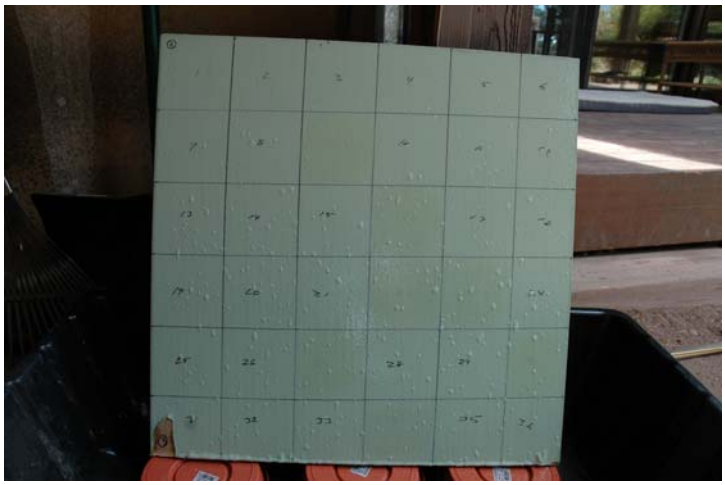

Figure 5. Washing the panel with Simple Green.

After the treatment, the panels were sampled in the same manner as in the pre-sample portion of the project and the samples sent to DataChem laboratories for analysis.

In this second portion of the experiment, we took two of the painted drywall panels for further testing. We utilized the panel that had not been treated and the panel that had been washed two times. Both panels had been kept wrapped in plastic since the last sampling period on July 23, 2008. At the time of being packaged, the untreated drywall sample had a mean methamphetamine concentration of 13.6 ug/100 cm^2 and the panel with two washes had an average concentration of 5.2 ug/100 cm^2.

The two panels were removed from the plastic bag and sampled using a 3" x 3" gauze wipe that had been wetted with 3 ml of reagent grade methanol. The squares sampled were squares that had not been previously sampled. A total of 10 squares were sampled, five from each panel.

After that sampling the drywall sample with the 2 washes was put away. For the previously untreated panel, the 5 squares that had just been sampled were sampled again by removing the paint using a scalpel. Five more squares that had not been sampled were also sampled by removing all of the paint.

Figure 6. Drywall panel illustrating the 100 cm^2 paint squares that were removed from the drywall.

All of the samples were sent to DataChem Laboratories for analysis by liquid chromatography and mass spectrometry.

Results:

During this experiment, a total of 20 samples were collected in four groups of 5 samples. Ten of the samples were wipe samples using methanol that were designed to determine

the drop in methamphetamine over the past two months while the panels were in storage. The next five samples were cutouts of the paint that had just been sampled to determine the amount of methamphetamine that had been left behind due using the wipe sampling method and five samples were cutouts from squares that had not been previously sampled. These last five samples would be compared to the value of the previous cutout and wipe samples to see if they would be equivalent.

The results of the first portion of the experiment to compare the persistence of the methamphetamine in the panels were as follows:

Treatment	*Date Sampled*	*Mean Meth Conc.*	*Median Meth Conc.*	*% Mean Reduction*	*% Median Reduction*
No Treatment	7/22/2008	13.6	13		
No Treatment	9/7/2008	5.5	4.8	59.9	63.1
Two Washes	7/22/2008	5.2	4.5		
Two Washes	9/7/2008	2.5	2.6	52.3	42.2

Concentration is in ug/100 cm^2

These results indicate that in 47 days, the methamphetamine level on the previously contaminated materials declined approximately 50 % on each of the materials. The drywall that had not been cleaned had a slightly higher reduction than did the cleaned portion suggesting that some of the easiest material to be removed had already been removed from the washed material. However, the amount of reduction appears to be very similar and suggests that even the deeper methamphetamine that is held in the paint may be removed with time.

Another sampling was conducted on January 19, 2009 to determine the reduction in methamphetamine levels after more than 5 months. In this case, drywall that was not treated and drywall that had been washed three times in July were re-sampled to determine the reduction in levels of methamphetamine. The results were as follows:

Treatment	*Date Sampled*	*Mean Meth Conc.*	*Median Meth Conc.*	*% Mean Reduction*	*% Median Reduction*
No Treatment	7/24/2008	14.3	14		
No Treatment	1/19/2009	3.2	3.2	77.6	77.1
Three Washes	7/24/2008	3.3	3		
Three Washes	1/19/2009	0.62	0.6	81.3	80

Concentration is in ug/100 cm^2

The second sampling effort revealed an even larger decrease in the amount of methamphetamine recovered from the painted drywall. In both instances, the percent reduction was close to 80% as compared to the 40% - 60% obtained during the earlier sampling. In this case, the amount of reduction was very similar in both the treated drywall and the untreated drywall. These data suggest that over a period of 179 days, approximately 80% of the removable methamphetamine on a painted drywall surface is removed from the surface.

The second portion of the experiment was to determine how much of the methamphetamine was contained in the paint of the drywall after sampling using a methanol wipe. The results of this portion of the experiment were as follows:

Sample Type	*Mean Meth Level*	*Median Meth Level*	*Mean % of Total Meth Level#*	*Median % of Total Meth Level**
Wipe Only	5.5 ug/100 cm^2	4.8 ug/100 cm^2	36.9%	34.3%
Cut Out After Wipe	8.6 ug/100 cm^2	8.6 ug/100 cm^2	57.8%	61.4%
Cut Out	14.8 ug/100 cm^2	14.0 ug/100 cm^2		
Cut Out After Wipe + Wipe	14.0 ug/100 cm^2	13.4 ug/100 cm^2		

= Mean wipe only/mean cut out value x 100
* = Median wipe only/median cut out value x 100
These results indicated that the wipe only removed approximately 35% of the methamphetamine present within the paint on the drywall. Another 60% of the methamphetamine remained impregnated in the paint. This impregnated amount will be removed incrementally as the painted drywall continues to be sampled.

Discussion:

The results of this experiment indicate that the amount of methamphetamine present within painted drywall does appear to decrease over time. In fact, the decrease is faster than we had anticipated in light of the higher levels of methamphetamine that we have found on surfaces in clandestine methamphetamine laboratories. The decrease observed in this experiment ranged from 50% - 60% over a period of only 47 days. At the end of 179 days, the reduction had increased to approximately 80% of the initial removable methamphetamine present on the surface. Factors such as temperature, humidity, surface pH, and others may also influence the rate of decrease from surfaces within a residence.

The second portion of this experiment revealed that sampling a contaminated piece of drywall with a methamphetamine wipe wetted with methanol does not remove all of the methamphetamine present on the material. In fact, a methanol wipe only removed approximately 35% of the methamphetamine present within the paint. In a previous experiment we inoculated methamphetamine onto a painted drywall surface using a micro-pipette and found that the recovery rate was approximately 75% of the material

that was inoculated. When the methamphetamine was put onto the surface using aerosolization of the methamphetamine similar to what would happen in a clandestine laboratory or use situation, only a 35% recovery was noted. This may be due to deeper penetration of the methamphetamine into the paint or to other factors not yet identified.